DACW-33-87-D-0007 Delivery Order 0006
Hop Brook Dam, Naugatuck, CT

OFFICE COPY DO NOT REMOVE

ATLANTIC TESTING LABORATORIES, LIMITED

atl

Box 29
Canton, N.Y. 13617
(315) 386-4578

Box 356
Cicero, N.Y. 13039
(315) 699-5281

June 10, 1988

U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

Attn: Mr. Paul L'Heureux

Re: Subsurface Investigation
Hop Brook Dam, Naugatuck, CT
Contract DACW33-87-D-0007
Delivery Order No. 0006
ATL Report No. CD031-5-88

Gentlemen:

In accordance with Delivery Order No. 0006, dated 02 May 1988, attached is our final Engineering Report for the subsurface investigation performed at Hop Brook Dam, Naugatuck, Connecticut.

By copy of this letter, we are forwarding two copies to the Chief of the Geotechnical Engineering Branch.

If you have any questions or comments, please do not hesitate to call.

Respectfully submitted,

Sharon M. Fullerton for

Gregory R. Hargrave
Geologist

GRH/smf

encs.

SECTION 1

SUBSURFACE INVESTIGATION

HOPBROOK DAM
NAUGATUCK, CT

CONTRACT DACW 33-87-D-0007
CONTRACTING OFFICER:
Stanley J. Murphy, Lt. Col., CE
Deputy Division Engineer

DELIVERY ORDER NO. 0006
02 MAY 1988

PREPARED FOR: U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

PREPARED BY: Gregory R. Hargrave
Atlantic Testing Laboratories, Limited
P. O. Box 29
Canton, NY 13617

May 31, 1988

ATL Report No. CD031-5-88

SECTION 2

TABLE OF CONTENTS

SECTION 3

SCOPE OF INVESTIGATION

A. Delivery Order No. 0006

CHECKED BOX APPLIES			PAGE 1 OF
	X ORDER FOR SUPPLIES OR SERVICES	☐ REQUEST FOR QUOTATIONS NO. RETURN COPIES OF THIS QUOTE BY (THIS IS NOT AN ORDER See DD Form 1155r)	2

(CDC31)

1 CONTRACT PURCH ORDER NO	2 DELIVERY ORDER NO	3 DATE OF ORDER	4 REQUISITION PURCH REQUEST NO	5 CERTIFIED FOR NATIONAL DEFENSE UNDER DMS REG 1
DACW33-87-D-0007	0006	88 MAY 02	GEB 88-19	00

6. ISSUED BY Dept. of the Army CODE
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149
Buyer/Symbol: Apidianakis/CENED-CT-C Phone: 617/647-8207

7 ADMINISTERED BY (If other than 6) CODE

8 DELIVERY FOB: X DEST ☐ OTHER (See Schedule if other)

9. CONTRACTOR QUOTER CODE FACILITY CODE

NAME AND ADDRESS
Atlantic Testing Laboratories, Limited
P.O. Box 29
Canton, New York 13617

10 DELIVER TO FOB POINT BY: In accordance with Paragraph 6 of the Scope of Work

11 CHECK IF BUSINESS IS: ☐ SMALL ☐ SMALL DISADVANTAGED ☐ WOMEN-OWNED

12 DISCOUNT TERMS: NET

13 MAIL INVOICES TO: Finance & Accounting Officer at issuing office

XXXXX Services for: CODE
U.S. Army Engineer Division, New England
ATTN: Geotechnical Engineering Branch
424 Trapelo Road
Waltham, Massachusetts 02254-9149

14 PAYMENT WILL BE MADE BY CODE
Finance and Accounting Officer
U.S. Army Engineer Division, N.E.
424 Trapelo Road
Waltham, Massachusetts 02254-9149

MARK ALL PACKAGES AND PAPERS WITH CONTRACT OR ORDER NUMBER

16. TYPE OF ORDER
DELIVERY: X — This delivery order is subject to instructions contained on this side of form only and is issued XXXXXXXXXXXXXXXX or in accordance with and subject to terms and conditions of above numbered contract
PURCHASE: Reference your ____ furnish the following on terms specified herein, including, for U.S. purchases.
General Provisions of Purchase Order on DD Form 1155r (EXCEPT CLAUSE NO 12 APPLIES ONLY IF THIS BOX ☐ IS CHECKED, AND NO. 14 IF THIS BOX ☐ IS CHECKED): special provisions ____ and delivery as indicated. This purchase is negotiated under authority of 10 USC 2304(a)(3) or as specified in the schedule if within the U.S., its possessions or Puerto Rico, if otherwise under 2304(a)(5)
☐ If checked, Additional General Provisions apply; Supplier shall sign "Acceptance" on DD Form 1155r and return ____ copies

17. ACCOUNTING AND APPROPRIATION DATA/LOCAL USE
96X3123 O&M CE Civil
CC1123440A00000 (MD) $29,963.00

GEB
STATUS
AE/PS
EJA/ckh

18. ITEM NO.	19. SCHEDULE OF SUPPLIES SERVICES	20. QUANTITY ORDERED/ ACCEPTED*	21. UNIT	22. UNIT PRICE	23. AMOUNT
Contract Line		APPROX.			ESTIMATED
	Furnish the necessary personnel and equipment to perform explorations at Hop Brook Dam, CT., in accordance with Attachment No. 1				
1.1	Geologist	140	HR	$42.00	$5,880.00
1.3	Per Diem - Overnight Stay	16	DAY	50.00	800.00
1.4	Mileage from Waltham, MA and return	260	MI	.35	91.00
2.1	Geotechnical Report	1	JOB	55% of line item 1.1	3,234.00

*If quantity accepted by the Government is same as quantity ordered, indicate by √ mark. If different, enter actual quantity accepted below quantity ordered and encircle.

24 UNITED STATES OF AMERICA
STANLEY J. MURPHY, Lt. Col., CE, Deputy Division Engineer
CONTRACTING/ORDERING OFFICER
XXXXX

25 TOTAL $29,963.00
29. DIFFERENCES
30. INITIALS

26. QUANTITY IN COLUMN 20 HAS BEEN:
☐ INSPECTED ☐ RECEIVED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED

DATE ____ SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

27. SHIP NO ____ ☐ PARTIAL ☐ FINAL
28. D.V. VOUCHER NO
31. PAID BY
32. AMOUNT VERIFIED CORRECT FOR
33. PAYMENT ☐ COMPLETE ☐ PARTIAL ☐ FINAL
34. CHECK NUMBER
35. I certify this account is correct and proper for payment.
DATE ____ SIGNATURE AND TITLE OF CERTIFYING OFFICER
35. BILL OF LADING NO

37. RECEIVED AT	38. RECEIVED BY	39 DATE RECEIVED	40 TOTAL CONTAINERS	41 S/R ACCOUNT NUMBER	42 S/R VOUCHER NO

STANDARD FORM 36 JULY 1966
GENERAL SERVICES ADMINISTRATION
FED PROC REG (41 CFR) 1-16.101
Exception Approved March 1977

CONTINUATION SHEET

REF NO OF DOC BEING CONT'D: Delivery Order No. 0006 to DACW33-87-D-0007

PAGE 2 OF 2

NAME OF OFFEROR OR CONTRACTOR: ATLANTIC TESTING LABORATORIES, LIMITED

Contract Line ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		APPROX.			ESTIMATED
3.1	Mobilization and Demobilization	1	JOB	350.00	350.00
3.2	Mileage from and to Waltham, MA	260	MI	.35	91.00
3.4	Survey Crew and Equipment	1	DAY	560.00	560.00
3.5	Overnight Per Diem for Survey Crew	1	DAY	100.00	100.00
3.6	Data Reduction and Plotting	1	JOB	80% of Line Item 3.4	448.00
6.1	Mobilization and Demobilization	1	JOB	1,100.00	1,100.00
6.2	Mileage from/to Waltham, MA	260	MI	1.15	299.00
6.5	Standby time/on site moves	40	HR	80.00	3,200.00
13.1	0-30 Ft. Depth	32	EA	14.00	448.00
13.2	31-50 Ft. Depth	21	EA	17.00	357.00
13.3	51-100 Ft. Depth	35	EA	21.00	735.00
17.1	BX, NX Size	30	LF	22.00	660.00
17.2	HX and 6 Inch Size	50	LF	30.00	1,500.00
18.2	HX and 6 Inch Size	150	LF	30.00	4,500.00
22.3	NWX Size and/or NWM	35	LF	55.00	1,925.00
22.4	4X5½ Size, Dbl. Tube Barrel	15	LF	75.00	1,125.00
31.1	Light Lumber for Shoring Excavation	2	MBF	800.00	1,600.00
34.1	Truck with Towing Winch	12	HR	80.00	960.00

ATTACHMENT NO. 1

GEB REQUISITION 88-19-DACW 33-87-D-0007

DELIVERY ORDER NO. 6

INSPECTION AND EXPLORATION INSTRUCTIONS

PROJECT: Hop Brook Dam Explorations

SITE: Hop Brook Dam, Naugatuck, CT

PURPOSE: To determine the depth to bedrock and the composition of an abandoned railroad embankment.

1. SCOPE OF INVESTIGATIONS.

a. Four borings shall be completed at the locations shown on Attachment No. 2 according to the following schedule:

BORING	COMPLETION DEPTH BELOW BEDROCK SURFACE	ESTIMATED OVERBURDEN DEPTH
FD-A	15 FT	5 FT
FD-B	5 FT	92 FT
FD-C	5 FT	85 FT
FD-D	5 FT	45 FT

Locations have been staked in the field by the Government.

b. Soil sampling shall be accomplished by the SPT method. Sampling shall be continuous for FD-B and on 5-foot centers for FD-C and FD-D. There shall be no soil sampling in FD-A. It is imperative that the top of bedrock is determined and verified in all borings.

c. The Contractor shall survey the final locations and elevations of the explorations.

d. The inspector shall provide telephone reports to Mr. Paul L'Heureux, Corps of Engineers at tel. (617) 647-8597, at least once every working day. The alternate point of contact is Mr. John Hart at tel. (617) 647-8389.

e. All soil samples and cores shall be delivered by the Contractor to the Corps of Engineers, Division Materials Lab in coordination with the Laboratory Director at tel. (617) 647-8367, 8392.

2. SITE CONDITIONS.

Boring FD-A is in a gorge and is accessible only by descending the riprap slope of the dam or abutments. Borings FD-B, C, and D are at the crest of an abandoned railroad embankment which may be as narrow as 6 feet in places. The composition of the embankment is unknown. It is assumed to be random fill and could contain timber trestles.

3. COORDINATION.

The Contractor shall contact Mr. Paul L'Heureux, Corps of Engineers at tel. (617) 647-8597 one week prior to the start of work. The field inspector shall give a daily telephone report on the progress of the work to Mr. L'Heureux. The Contractor shall also coordinate with Mr. Les Butler, Project Manager at Hop Brook Dam, tel. (203) 729-8840.

4. EXPLORATIONS. (see exploration plan, Attachment 2)

Borings FD-A through FD-D shall be redesignated FD-88-1 through FD-88-4 in order of their completion.

5. GOVERNMENT REVIEW.

The Government will review the draft submittal as well as the completed work. Subsequent to such review, the Contractor shall accomplish any corrections which may be directed as the result of the Government review.

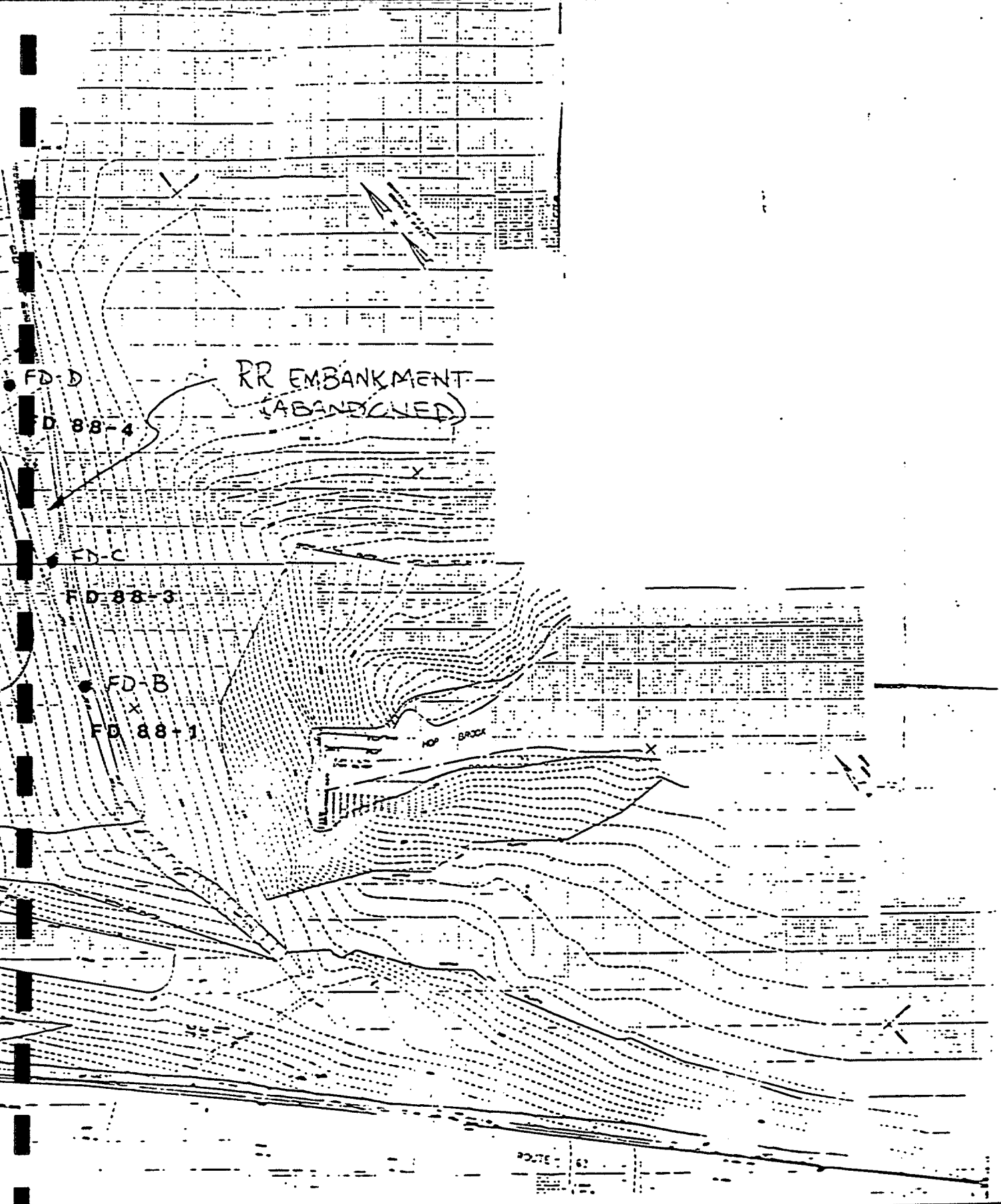
6. COMPLETION SCHEDULE.

Services under this delivery order shall start on or before 2 May 1988. Duration of the field work is estimated to be seventeen days. The geotechnical report shall be submitted in draft format for review (by the Government), postmarked no later than seven calendar days after the completion of field work. Government review will take approximately ten calendar days from the receipt of draft report. The final geotechnical report shall be submitted postmarked no later than seven calendar days after the receipt of the draft report with Government comments.

7. QUALITY CONTROL.

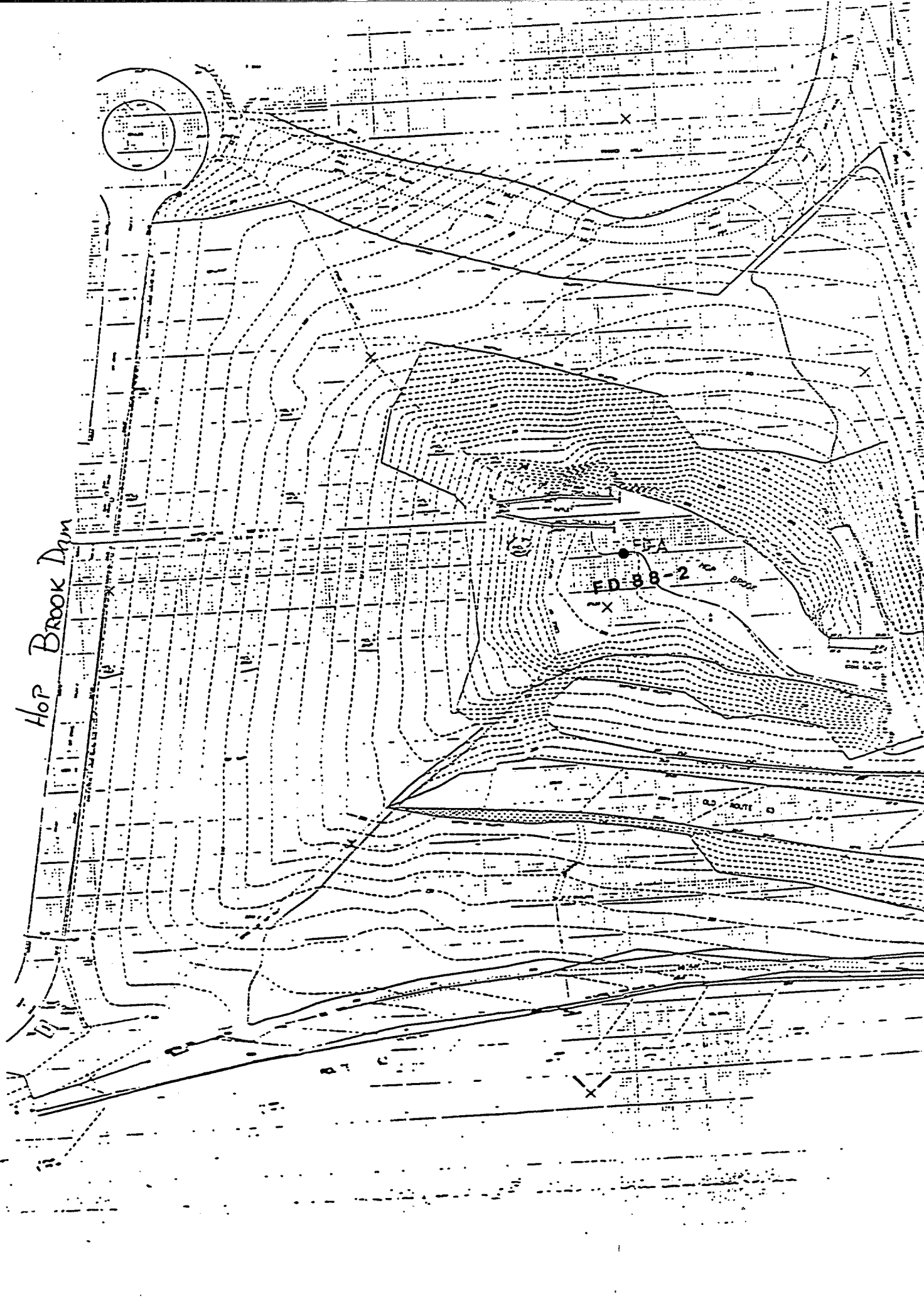
You will be held responsible for the quality of the maps submitted and for all damages caused the Government as a result of your negligence in the performance of any services furnished under the contract.

Although submissions required by your contract are technically reviewed by the Government, it is emphasized that your work must be prosecuted using proper internal controls and review procedures. The letter of transmittal for each submission which you make shall include a certification that the submission has been subjected to your own review and coordination procedures to insure (a) completeness for each discipline commensurate with the level of effort required for that submission, (b) elimination of conflicts, errors and omissions, and (c) the overall professional and technical accuracy of the submission. Documents which are significantly deficient in any of these areas will be returned to you for correction and re-submittal prior to our completing our review. Contract submission date will be extended if a re-submission of draft material is required for this reason.



HOP BROOK DAM
Naugatuck, Ct

approx scale 1" = 7=


Hop Brook Dam
FEA
FD 88-2
ROUTE 8

b. Project Site

The project is at the site of a flood control dam containing the waters of Hop Brook in Naugatuck, Connecticut. The investigation covered the toe of the dam and a railroad embankment immediately downstream from the dam. Boulder-sized rip-rap covered the work area at the toe of the dam, while loose cinders covered the railroad embankment. A General Project Map, Site Location Map, and Boring Location Plan are included in Section 8. A general plan of the site provided to us in the Delivery Order is in part (a) of this section.

c. Purpose

The purpose of the investigation was to recover soil and rock samples for classification and to determine the depth to bedrock. The information obtained through this study is to be used in determining the stability of the railroad embankment and the suitability of the soil contained within the railroad embankment for road construction purposes. Additional information obtained from the toe of the dam will be used for proposed construction in that general area.

d. Scope of Work

Survey, inspection, and exploration instructions, which were provided by the Army Corps of Engineers, New England Division, in Delivery Order No. 0006, are included in Section 3a. General inspection and exploration instructions were provided by the Army Corps of Engineers, New England Division, through the contract "Specifications for Various Locations in New England". Specific instructions and changes during the course of the work were given verbally during onsite visits and telephone conversations through a Corps of Engineers representative. All new instructions and changes can be found listed in Table II of Section 5.

Work under this Delivery Order consisted of locating four (4) test borings; Paul L'Heureux (USACE) assisted in locating the borings.

Drilling and sampling was performed by Atlantic Testing Laboratories' personnel using Atlantic Testing Laboratories' equipment. The test borings were advanced and sampled as indicated in the Delivery Order (Section 3a) and as outlined in the contract specifications and as amended in the conversations outlined in Table II, Section 5. Overburden sampling was performed using a 300 lb hammer driving a 2 or 5 foot split spoon sampler (2-3/8" I.D.) or 140 lb hammer driving a 2 foot split spoon sampler (1-3/8" I.D.) at the intervals designated in the Delivery Order.

A survey crew from Atlantic Testing Laboratories, Limited surveyed the final locations and elevations of the borings.

SECTION 4

QUALITY CONTROL

a. General Certification Statement

I hereby certify that the records, equipment and procedures mentioned below were used to perform the subsurface exploration described herein. I also certify that the work was performed in a professional manner and meets the requirements set forth in the Delivery Order. This report has been subject to my review and is both complete and technically accurate.

CERTIFIED June 10, 1988

Spencer F. Thew, P.E./L.S.

b. Records Taken

Pertinent drilling procedures, sampling operations, soil classifications and testing data were noted on the following forms provided for use by the Corps of Engineers:

NED 121 (Field Log of Test Boring, Summary)
NED 58 and 58a (Field Log of Test Boring)
NED 130 (Field Log of Test Boring in Rock)

A completed series of logs for each of the borings is included in Section 8 along with location maps.

Sample containers were labeled using ENG Form 1742 and were delivered to the USACE NED Materials and Water Quality Laboratory on May 27, 1988.

A summary of daily activities and a telephone log are in Tables I and II of Section 5, respectively. A chain of custody log is in Section 6. Safety meeting reports, NED Form 251, including exposure time for Atlantic Testing Laboratories', Corps of Engineers and subcontracted personnel, are located in Section 7.

c. Equipment Used

All equipment and supplies were provided by Atlantic Testing Laboratories, Limited, with the exception of that provided by subcontractors. A listing of pertinent equipment follows:

1. Survey Equipment

- Wild Heerburg, T-1, 6 minute Theodolite
- 25 feet, extendable, fiberglass, stadia rod

2. Drilling Equipment

- CME 850 ATV drill rig
- CME 45 drill rig mounted on skids
- HW (4") and NW (3") casing with both spin and drive shoes
- Drill rod, NX, 2 feet, 5 feet, and 10 feet lengths, used for sampling and turning 3-7/8" and 2-15/16" roller bits
- two centrifical pumps with 500 feet of black PVC pipe
- two 90 gallon tubs
- 3" O.D. by 5 foot diamond bit core barrel
- Split spoon samplers, 3" O.D. or 2-3/8" I.D. by 2 and 5 foot lengths and 2" O.D. or 1-3/8" I.D. by 2 foot length

3. Subcontracted Equipment

- International diesel tow truck, with two drums, 3/4" cables, with operator

d. Procedures

1. Survey Procedures

Atlantic Testing Laboratories, Limited surveyors were onsite May 25, 1988, to establish the as-drilled boring locations. Borings completed under this Delivery Order were referenced by occupying Station 4+60 which is the intersection of the road centerline (on the dam crest) and the outlet works (conduit) and the centerline of the road (on the dam crest) for horizontal control and the crest monument No. 4 (elevation 380.93') for vertical control.

2. Access Procedures

Boring FD88-2 (FD-A) was at the toe of the dam. This was accessed by disconnecting the guard rail cable, winching the CME 45 skid drill rig into place with its self-contained winch equipped with a 5/8" cable. A winch line from the subcontracted wrecker was used as a safety line during down slope movement. The wrecker, located on the dam crest, was used to move the rig up slope.

Borings located on the railroad embankment were accessed by the CME 850 ATV drill rig via an existing gravel trail.

3. Sampling and Drilling Procedures

Sampling techniques, as described in the contract and as modified during the work period, involved retrieving material using the Standard Penetration Test. A 3-inch O.D. or 2-3/8 inch I.D. by 2 or 5 foot long split spoon sampler was driven 2.0 or 5.0 feet and the blow counts for a 300 lb hammer falling 18 inches were recorded for every 0.5 feet advancement. Also, a 2-inch O.D. or 1-3/8-inch I.D. by 2 foot long split spoon sampler was driven 2 feet and the blow counts for a 140 lb hammer falling 30 inches were recorded for every 0.5 feet advancement. Refusal was defined as 100 blows with no penetration or bouncing refusal. The sampling interval was 5 feet or continuous as designated by the Delivery Order.

Samples were classified in the field in accordance with ASTM D-2488. Representative samples were taken from each soil sampling run and placed in one 16 oz jar with hermetically sealed lid. Rock core was placed in 5 ft long core box as specified in the contract. Sample jars were labeled using ENG Form 1742 and were delivered to the USACE NED Materials and Water Quality Laboratory on May 27, 1988. A chain of custody log was maintained to document custody of the samples between Atlantic Testing Laboratories and the Corps of Engineers.

The CME 850 and CME 45 are equipped to handle several different methods of drilling. Different techniques of advancing each hole, in conjunction with sampling, were employed which best suited the situation. These systems are generally described as follows:

- HW (4") spin casing cleaned with a 3-7/8" roller bit, used only to case the upper portion of FD88-4.

- NW (3") spin casing cleaned with a 2-15/16" roller bit, used to case the upper portion of FD88-2 (FD-A).

- HW (4") drive casing cleaned with a 3-7/8" roller bit. This method was most widely used to case borings.

- 3-7/8" roller bit was used to advance borngs when casing refusal was encountered. Clear Mud was used as a drilling fluid.

- NX diamond coring, washed with water, was used to penetrate rock and obtain rock core samples.

SECTION 5

SUMMARY OF ACTIVITIES
AND
TELEPHONE LOG

TABLE I

HOP BROOK DAM, CT

CD031 - DAILY ACTIVITY LOG

DATE	ACTIVITY
May 17, 1988 Tuesday	- Inspector (Greg Hargrave) and 850 Drill Crew (Mike Hawkins, Paul McAloon), CME 45 Drill Crew (Randy Todd, Robin Pryce) and Scott Fox onsite 6:30 a.m. to 6:30 p.m. Paul L'Heureux onsite 10:00 a.m. to 2:00 p.m. - Held Safety Meeting - Weather: overcast, 65-70 degrees with intermittent rain throughout day - Subcontractor onsite 2 to 6 p.m. (wrecker) - At 7:15 a.m. Jim Ferral (USACE) unlocked gates so crews could access site. - Inspector and drill crews located proposed boring locations. - CME 850 drill crew set up on FD-B (FD88-1); CME 45 crew began making access available in preparation for wrecker to set up on FD-A (FD88-2). Removed guard rail cables. - Paul L'Heureux (USACE) arrived and assisted inspector in locating proposed borings. - CME 850 started drilling on FD88-1 (FD-B) at 11 a.m. - Paul L'Heureux (USACE) discussed the following with G. Hargrave (ATL): he gave approval for drill crews to work over 10 hours per day provided inspector keeps him informed on a daily basis; ATL representative to direct any questions from State of Connecticut representatives regarding drilling operations to Mr. L'Heureux (USACE). The trench in the railroad embankment made by water from drilling operations is to be backfilled from the crest to approximately 15 ft below the crest. Ten feet (10') of rock core is to be taken from FD88-1 (FD-B). The bore holes are to be backfilled with onsite soils and possibly grouted; the inspector is to check with Mr. L'Heureux later regarding grout. - Wrecker arrived at 2 p.m. to assist CME 45 drill crew in setting rig on toe of the dam. - Wrecker off site at 6 p.m. - CME 850 drillers advanced FD88-1 (FD-B) to 55 ft.

May 17, 1988 (Continued)

- Inspector talked to Les Butler (USACE) regarding project; Les Butler gave inspector keys to the gates so drillers could begin work in the morning before USACE employees were onsite.
- 16 hours standby for bore hole moves.

May 18, 1988 Wednesday

- Inspector and drill crew onsite 6:30 a.m. to 6:30 p.m.
- Weather overcast, 70 degrees, intermittent light rain throughout day.
- CME 45 drill crew continued moving drill rig into position at toe of dam and started drilling FD88-2 (FD-A).
- CME 850 drill crew advanced FD88-1 (FD-A) to 109.5'.
- CME 45 drill crew advanced FD88-2 (FD-A) to 17.5'.
- Four (4) hours standby time for bore hole move.

May 19, 1988 Thursday

- Inspector and drillers onsite 6:30 a.m. to 6:00 p.m.
- Weather overcast, raining intermittently, 70 degrees.
- Subcontractor onsite 2:30 p.m. to 4:15 p.m.
- CME 850 drill crew grouted FD88-1 (FG-B) and pulled casing. CME 850 was then set up on FD88-3 (FD-C) and started drilling operations.
- CME 45 drill crew continued advancing FD88-2 (FD-A) to 31.5' with bedrock at 12.5'. Although 15' of bedrock was requested, 20' was taken due to gravel at the beginning of run 4 suggesting bedrock occurred at 16.5' not 12.5'. Lather it was established the casing was not properly seated in the bedrock at 12.5' which allowed gravel to leak into the hole. At completion of FD88-2 (FD-A) the crew secured the CME 45 for the trip up the dam face. The tow truck pulled the CME 45 up the face of the dam.
- Hole FD88-3 (FD-C) was advanced to 56.2'.
- 6.5 hours standby for bore hole moves.

May 20, 1988 Friday

- Inspector and drillers onsite 6:30 a.m. to 11:00 a.m.
- Weather overcast, raining intermittently, 70 degrees.
- CME 850 drill crew advanced hole FD88-3 (FD-C) to 75.3'.
- Drill crew picked up the site and departed.
- Les Butler (USACE) gave the ATL crew permission to store soil samples, rock core and various other equipment at the Corps office garage. Also gave permission to ATL crew to park Mac truck and trailer next to Corps office.

May 23, 1988
Monday

- Inspector and drillers onsite 1:30 to 7:30 p.m.
- Weather hot, humid and partly cloudy.
- Vandals struck over the weekend; they threw the mud tubs down the railroad embankment, pulled circuit breakers out of drill rig and pulled gin line out of tower.
- Drill crew pulled casing out of FD88-3 (FD-C) and moved to FD88-4 (FD-B) which was advanced to 28'.
- One hour standby for bore hole move.

May 24, 1988
Tuesday

- Inspector and drill crews onsite 6:30 a.m to 3:30 p.m.
- Tony Firicano (USACE) onsite 10 a.m. to noon.
- Weather hot, humid, partly cloudy.
- Held safety meeting.
- Drillers continued to advance FD88-4 (FD-D).
- Tony Firicano (USACE) arrived onsite at 10 a.m. to watch drilling operations.
- Drillers terminated hole at 43.5' after taking 10' of rock core.
- G. Hargrave (ATL) asked T. Fericonno (USACE) if there was anything more he wanted done (i.e., more rock core from FD88-4 (FD-D) or more holes); he said no.
- The inspector organized the rock core in core boxes.
- One hour standby, bore hole move.

May 25, 1988
Wednesday

- Survey crew and inspector onsite 9 a.m. to noon.
- Weather rainy, 60 degrees.
- Geotechnical inspector assisted survey crew in locating borings to be surveyed.
- Survey crew completed survey of boring locations and elevations.
- Geotechnical inspector returned key to gates to USACE representative at Hop Brook office.
- Geotechnical inspector removed rock core boxes from USACE garage and made final inspection of site.

TABLE II

HOP BROOK DAM, CT.

CD031 - DAILY TELEPHONE LOG

Date	Conversation
March 18, 1988 Friday	- 9 a.m. - Ron DeFilippo (USACE) to Spencer Thew (ATL) Railroad Embankment: 3 holes - 1 - 92' overburden & 5' bedrock 1 - 85' overburden & 5' bedrock 1 - 45' overburden & 5' bedrock R. DeFilippo (USACE) estimated 12 days of drilling and is preparing the Delivery Order.
May 12, 1988 Thursday	- 10:45 a.m. - Ron DeFilippo (USACE) to Spencer Thew (ATL) R. DeFilippo (USACE) indicated that the Delivery Order No. 6 for Hop Brook Dam was in the mail. S. Thew (ATL) told R. DeFilippo (USACE) that he had received it on or about Tuesday, May 10 and that he is currently scheduling the project and would return a call to him to tell him the specific schedule. - 3:30 p.m. - Spencer Thew (ATL) to Ron DeFilippo (USACE) S. Thew (ATL) notified R. DeFilippo (USACE) that mobilization would be on Monday, May 16, 1988, and drilling would start at 8 a.m. to 10 a.m. on Tuesday, May 17. ATL will be mobilizing two drill rigs - CME 850 to do the three deep borings at the top of the dam and a second rig to do one boring at toe of the dam. R. DeFilippo (USACE) authorized two mobilization charges during the conversation.
May 17, 1988 Tuesday	- 9 a.m. - Greg Hargrave (ATL) to USACE office in Waltham, MA Tried to contact Paul L'Heureux (USACE) regarding job start-up. Tony Ferriconno (USACE) said Paul L'Heureux (USACE) was on his way to the job site. - 9:45 a.m. - Greg Hargrave (ATL) to Tom Pahler (ATL) Greg Hargrave gave T. Pahler job up-date.

May 18, 1988
Wednesday

- 4 p.m. - G. Hargrave (ATL) to Paul L'Heureux (USACE)

  Yuri Yatsevitch (USACE) answered phone and then phone connection was broken. G. Hargrave (ATL) tried repeatedly until 4:30 p.m. to contact USACE office but no one answered.

- 4:30 p.m. - G. Hargrave (ATL) to ATL main office

  G. Hargrave (ATL) gave T. Pahler (ATL) job up-date.

May 19, 1988
Thursday

- 8:30 a.m. - G. Hargrave (ATL) to John Hart (USACE)

  G. Hargrave (ATL) gave progress report and previous two days time to J. Hart (USACE). J. Hart (USACE) wants drillers to use a 2" spoon to improve sample recovery. Once the holes are done, they do not have to be grouted but are to be backfilled with onsite soils.

- 10:45 a.m. - G. Hargrave (ATL) to Tony Firicano (USACE)

  G. Hargrave (ATL) gave T. Ferriconno (USACE) job up-date; also asked if a 300 lb hammer could be used in lieu of a 140 lb hammer for sampling. He said no - use the 140 lb hammer with the 2" O.D. spoon.

May 20, 1988
Friday

- 8 a.m. - G. Hargrave (ATL) to ATL Main office

  G. Hargrave asked J. Scott (ATL) to ask T. Pahler (ATL) if there was anything to bring home; T. Pahler said no.

- 8:15 a.m. - G. Hargrave (ATL) to Paul L'Heureux (USACE)

  G. Hargrave (ATL) gave P. L'Heureux (USACE) job up-date and told him why 20' of bedrock was taken on FD88-2 (FD-A); also gave him names of the drill crew.

- 9:45 a.m. - G. Hargrave (ATL) to J. Hart (USACE)

  G. Hargrave (ATL) gave J. Hart (USACE) a job up-date and previous days' time then told him drillers have advanced approximately 6' into bedrock, penetrating one foot with the roller bit and 5' with the diamond core bit. J. Hart (USACE) requested another 5' run.

- 10 a.m. - G. Hargrave (ATL) to John Hart (USACE)

  G. Hargrave (ATL) explained the risks involved in obtaining another 5' run (i.e., hole was starting to collapse making coring difficult). J. Hart agreed that the hole had been advanced far enough but on the next hole, 10' of bedrock is to be obtained.

May 23, 1988
Monday

- 8:30 a.m. - G. Hargrave (ATL) to USACE (Hop Brook Dam Office)

  G. Hargrave (ATL) told USACE representative at dam that drill crew would be onsite at approximately 2 p.m.

- 8:35 a.m. - G. Hargrave (ATL) to Tony Ferriconno (USACE)

  G. Hargrave (ATL) told T. Ferriconno (USACE) that drill crew would be on-site at approximately 2 p.m. He told G. Hargrave (ATL) that he would be onsite tomorrow.

May 24, 1988
Tuesday

- 8:30 a.m. - G. Hargrave (ATL) to Tom Pahler (ATL), Canton

  T. Pahler (ATL) told G. Hargrave (ATL) that survey crew will be onsite today or tomorrow. G. Hargrave (ATL) is to check back later in day.

- 1:15 p.m. - G. Hargrave (ATL) to T. Pahler (ATL) at Canton

  T. Pahler told G. Hargrave that the survey crew would be on-site tomorrow.

SECTION 6

CHAIN OF CUSTODY LOG

ATLANTIC TESTING LABORATORIES, Limited

CHAIN OF CUSTODY LOG

PROJECT: Hop Brook Dam, CT
D.O. 0006

ITEMS:

Tubes _____

Bottles _____

Jar Samples (4 boxes)

Core Boxes 5

Sampling Logs 4

Date & Time Received	Date & Time Transferred	Comments	Custodian
as sampled	5/25/88 (1:30 pm)		G. Hargrave (ATL)
5/25/88 (1:30 pm)	5/27/88 6:45 AM		A. Brown (ATL)
5/27/88 6:45 AM	5/27/88 1:10		J. KING (ATL)
5/27/88 1:10			H Boudreau

SECTION 7

SAFETY REPORTS

WEEKLY SAFETY MEETING

NEDSO

Date held 5-17-88

THRU: Area Engineer, New England Area

Time 6:00-6:15

TO: Safety Office, NED

Report No. 1

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0006 Contractor Atlantic Testing Laboratories Ltd.

Conducted By Greg Hargrove All personnel present (Contr) -6-
(Sub) -0-
(Govt) -0-

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - gloves, safety shoes, and hard hats

✓ Prevention of Falls - be careful around steep slopes

✓ Back Injury, Safe Lifting Techniques -

Fire Prevention -

✓ Sanitation, First Aid, Waste Disposal - keep work area neat

Tripping Hazards - trash, hose, nails in lumber -

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) -

✓ Hoisting Equipment -

✓ Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes -

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by Greg Hargrove Title Geologist

2. Forwarded.

Signature Greg P. Hargrove
Resident Engineer

CP: EXPOSURE HOURS:
Work Date: 5/23, 5/24, 5/25
Non-work Date: 5/22, 5/26, 5/27, 5/28

Man Hours:
Contr: 179.25
Subcontr: 5.75
Govt: 4
TOTAL: 189

NED APP FL 25I

WEEKLY SAFETY MEETING

NEDSO

Date held 5-24-88

THRU: Area Engineer, New England Area

Time 6:00 - 6:15

TO: Safety Office, NED

Report No. 2

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0006 Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Hargrave All personnel present (Contr) -3-
(Sub) -0-
(Govt) -0-

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - Hard hat, gloves, safety shoes

✓ Prevention of Falls - watch steep slopes

✓ Back Injury, Safe Lifting Techniques - use proper equipment

Fire Prevention -

✓ Sanitation, First Aid, Waste Disposal - keep work area neat

Tripping Hazards - trash, hose, nails in lumber - "

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) -

✓ Hoisting Equipment - zero defects

Ropes, Hooks, Chains and Slings - " "

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes -

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by Greg Hargrave Title Geologist

2. Forwarded.

Signature Gregory R. Hargrave
Resident Engineer

CP: EXPOSURE HOURS:
Work Date: 5/17, 5/18, 5/19, 5/20
Non-work Date: 5/16, 5/21

Man Hours:
Contr: 69.0
Subcontr: 0
Govt: 2.0
TOTAL: 71.0

NED APP FL 25!

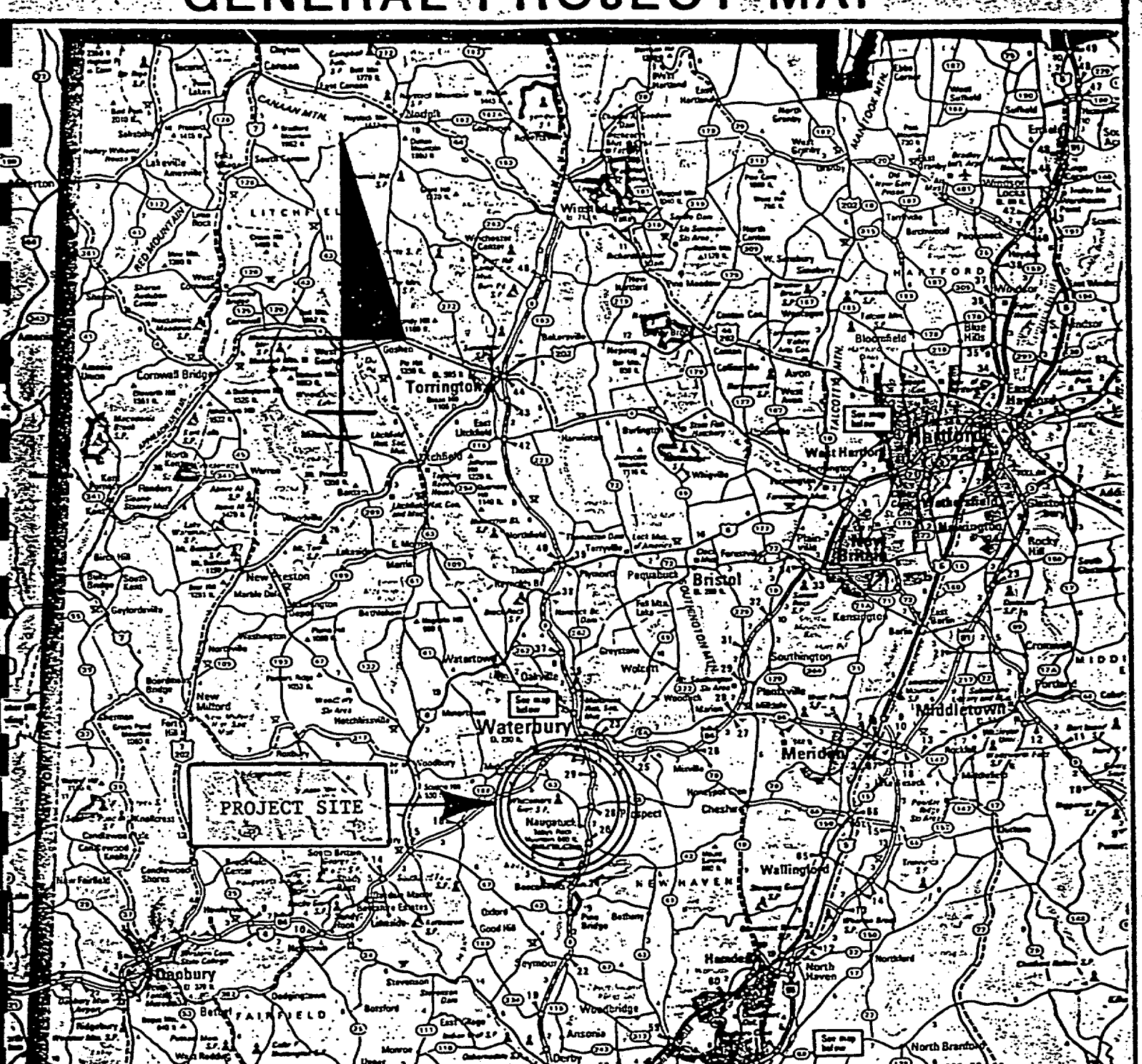
SECTION 8

FIELD INSPECTOR'S LOGS

a. Figure 1 – General Project Map

FIGURE 1

GENERAL PROJECT MAP

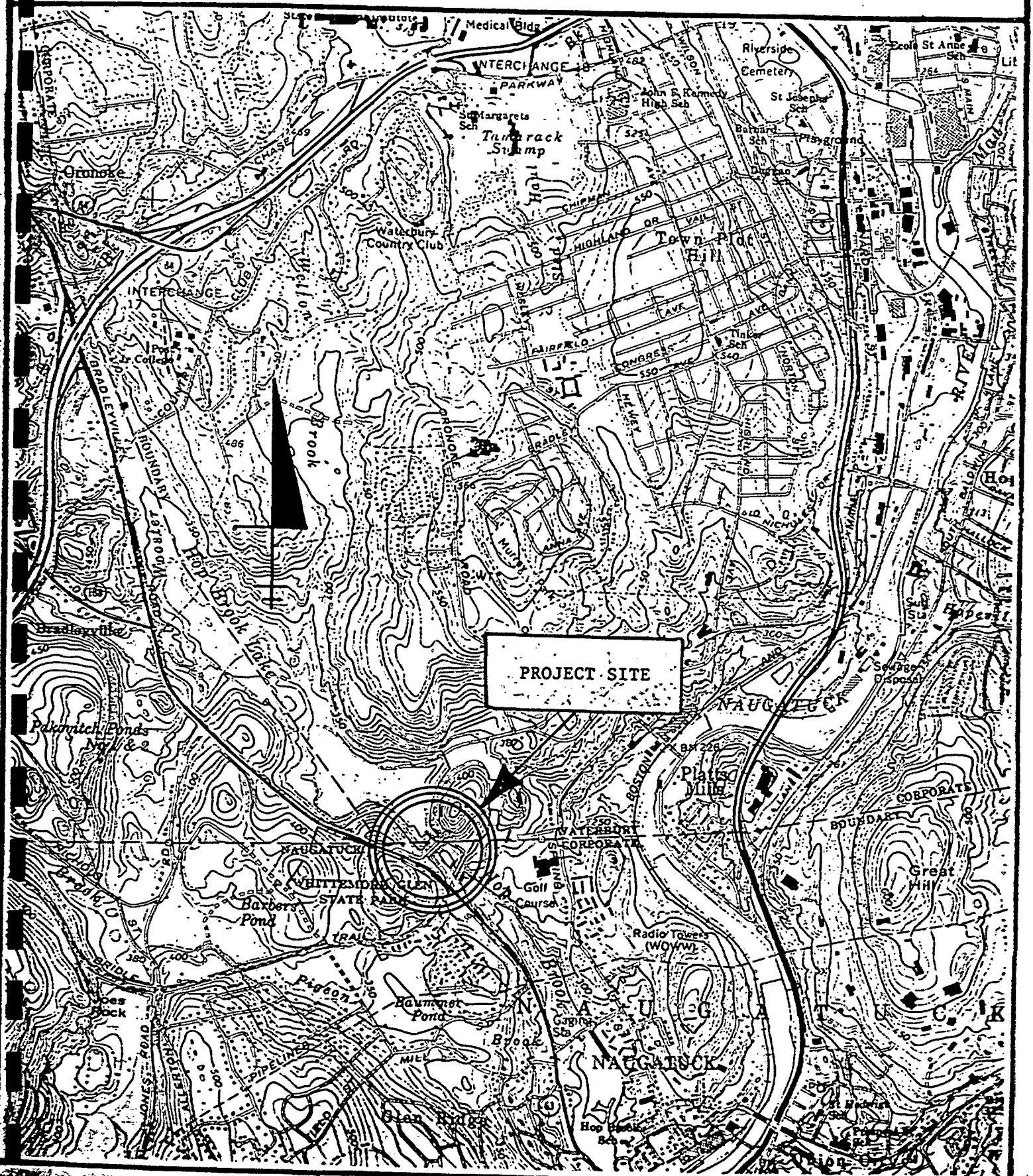


PROJECT No CD031	SCALE: 1" = 7 miles	CONNECTICUT

b. Figure 2 - Site Location Map

FIGURE 2

SITE LOCATION MAP

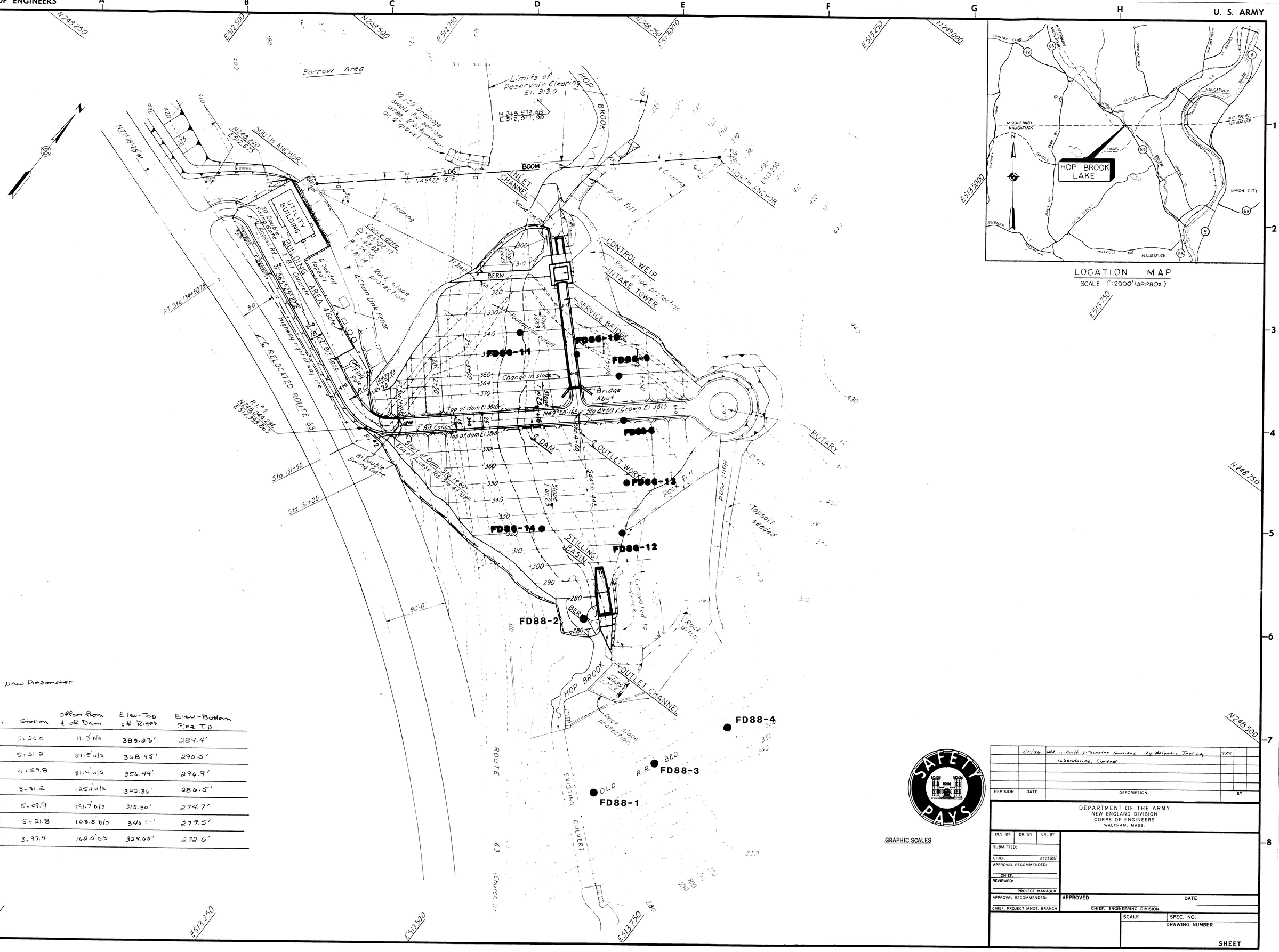


PROJECT No CD031 | SCALE: 1:24,000 | U.S.G.S. QUAD: WATERBURY, CONN.

c. Figure 3 – Boring Location Plan

CORPS OF ENGINEERS

U. S. ARMY



LOCATION MAP
SCALE 1"=2000' (APPROX.)

● New Piezometer

Piezometer	Station	Offset from ℄ of Dam	Elev-Top of Riser	Elev-Bottom Piez Tip
FD86-8	5+20.0	11.3' D/S	383.23'	284.4'
FD86-9	5+21.2	51.5' U/S	368.45'	290.5'
FD86-10	4+59.8	81.4' U/S	356.44'	296.9'
FD86-11	3+81.2	125.1' U/S	342.36'	286.5'
FD86-12	5+09.9	191.7' D/S	315.90'	274.7'
FD86-13	5+21.8	103.5' D/S	346.51'	279.5'
FD86-14	3+97.4	162.0' D/S	324.65'	272.6'

GRAPHIC SCALES

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY
	2/21/86	add as built piezometer locations by Atlantic Testing Laboratories, Limited	TAS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY	DR. BY	CK. BY

SUBMITTED:
CHIEF, SECTION
APPROVAL RECOMMENDED:
CHIEF,
REVIEWED:
PROJECT MANAGER
APPROVAL RECOMMENDED:
CHIEF, PROJECT MNGT. BRANCH
APPROVED
DATE
CHIEF, ENGINEERING DIVISION

SCALE | SPEC. NO.
DRAWING NUMBER
SHEET

d. Boring Logs

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. DO 0006

Site Hop Brook C.T.
Page 1 of ___ Pages

Hole No. FD88-1 (FD-8) Diam. (Casing) HW (4")
Boring Started May 17, 1988

Co-ordinates: N _____ E _____
Boring Completed May 18, 1988

Drilled by M. Hawkins & P. Mc Aloon
Report Submitted May 31, 1988

Purpose of Exploration To determine subsurface soil condition and depth

Elevation Top of Hole 370.3 M.S.L.
Total Overburden Drilled 99.9 Feet
Elevation Top of Rock 270.4 M.S.L.
Elevation Bottom of Hole 260.8 M.S.L.
Total Rock Drilled 19.5 Feet
Total Depth of Hole 109.5 Feet
Core Recovered 83.9 %
Core Recovered 16.1 Ft.: NX Diam. 2⅛ In.
Soil Samples 3 In. Diam. 18 No.
Soil Samples _____ In. Diam. ____ No.

Casing Left in Place 0 Feet
Water Table Depth _____

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	90'	HW casing advanced with 300 lbs hammer
0	90'	continuous soil sampling
90.0	90.3	3⅞" O.D. roller bit
90.3	109.5	NXM DIAMOND CORE

INDEX

Prepared by Gregory R. Hargrave
Field Data
Lab. Data

Submitted by Atlantic Testing Laboratories, Limited

NED FORM DEC 63 121

REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Hop Brook CT Page 2 of ___ Pages

Boring No. FD88-1 Desig. FD B Diam. (Casing) 4" (HW)

Co-ordinates: N ___ E ___

Elevation Top of Boring 370.9 M.S.L.
Total Overburden Drilled 99.9 Feet
Elevation Top of Rock 270.4 M.S.L.
Total Rock Drilled 19.2 Feet
Elevation Bottom of Boring 260.8 M.S.L.
Total Depth of Boring 109.5 Feet
Core Recovered 83.9 % No. Boxes 1
Core Recovered 19.2 Ft : NX Diam. 2 1/8 In.
Soil Samples 3 In. Diam. 18 No.
Soil Samples ___ In. Diam. ___ No.

Hammer Wt. 300lbs Boring Started 5-17-88
Hammer Drop 18in Boring Completed 5-18-88
Casing Left 0
Subsurface Water Data ___ Page ___
Obs. Well NA
Drilled By M. Hawkins + P. McAloon
Mfg. Des. Drill CME 850
Inspected By: Greg Hargrave
Classification By: Greg Hargrave
Classification By: ___

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0			Rec	1	Sampled using 3" O.D x 5' split spoon sampler using a 300 lbs hammer Advanced HW casing to 5' using a 300 lbs hammer Cleaned casing used 3 7/8" O.D. roller bit and water	Poorly graded sand with gravel (SP) Black sand and gravel sized cinders trace amounts of wood
				1		
				2		
				2		
	S-1	3"	10%	1		
				5		
				3		
				20		
				2		
5'				1		
				WOH	Sampled from 5' to 10' Advanced casing to 10' Cleaned casing to 10'	Similar Soils (SP)
	S-2A	3"	20%	↓		
				1		
				1		Silty Sand (SM) About 60% sand, 30% fines, and 10% gravel, moist, non plastic)
				↓		
	S-2B			1		
				1		
				1		
10'				↓		

GENERAL REMARKS:
WOH Denotes weight of hammer
WOR Denotes weight of rod

Site	Boring No.	Page 3 of ___
Hop Brook CT	FD 88-1 (FD-13)	

DEPTH		CORE/SAMPLE			BLOWS PER FT.	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1" to 2'	NO.	SIZE	DEPTH RECOVERY / CORE RECOVERY			
10'				Rec.	1	Sampled from 10' to 15'	Similar Soils (SM)
					1	Advanced casing to 15'	
					1	Cleaned casing to 15'	
					1		
		S-3	3"	40%	1		
					1		
					2		
					1		
					1		
15'					1		
					6	Sampled from 15' to 20'	Similar Soils (SM)
					1	Advanced casing to 20'	
					1	Cleaned casing to 20'	
					1		
		S-4	3"	20%	1		
					1		
					1		
					1		
					2		
20'					1		
					9	Sampled from 20' to 25'	Silty sand with gravel (SM) about 45% cm f sand 30% silt and 25% gravel (moist, non-plastic)
					2		
					2	Advanced casing to 25'	
					1	Cleaned casing to 25'	
		S-5	3"	40%	2		
					3		
					2		
					2		
					1		
25'					1		
					1	Sampled from 25' to 30'	Well graded gravel (GW) about 95% brown cm f GRAVEL, ≤5% silt, ≤5% sand (saturated, non-plastic)
					1	Advanced casing to 30'	
		S-6	3"	10%	1	Cleaned casing to 30'	
					1		

Site: Hop Brook, CT	Boring No.: FD 88-1 (FD-B)	Page 4 of

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / Rec	BLOWS PER FT. / CORE RECVY	6' SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				1		
				1		
				WOH		
	S-6	3"		↓		
				1		
30'						
				1	Sampled from 30' to 35'	Silty sand (SM)
				↓	Advanced casing to 35'	about 65% brown cmf sand, 25% silt and 10% cmf gravel
				1	Cleaned casing to 35'	
	S-7	3"	20%	1		
				↓		
				1		
35'				1		
				WOH	Sampled from 35' to 40'	
					Advanced casing to 40'	
					Cleaned casing to 40'	
	S-8	3"	0%	↓		
40'						
				WOH	Sampled from 40' to 45'	Poorly graded sand (SP)
				1	Advanced casing to 45'	about 90% brown cmf sand, 5% silt and 5% mf gravel
				↓	Cleaned casing to 45'	
				1		
	S-9	3"	20%	1		
				1		
				2		
				2		

Site: Hop Brook CT

Boring No.: FD 88-1 FD-B

Page 5 of ____

DEPTH	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE RECVY	BLOWS PER FT.	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
45'			Rec	/ /		
	S-10	3"	10%	/ / 2 / / / / / /	Sampled from 45' to 50' Advanced casing to 50' Cleaned casing to 50'	Poorly graded gravel with sand (GP) about 80% brown cmf gravel, 15% cmf sand, and 5% silt
50'						
	S-11	3"	10%	WOH / / / / / / / / 2 2	Sampled from 50' to 55' Advanced casing to 55' Cleaned casing to 55'	Poorly graded sand (SP) about 85% brown cmf sand, 10% silt and 5% silt
55'					END OF EXPLORATION 5/17/88	
	S-12	3"	20%	WOH / / / / / / / /	EXPLORATION CONTINUED 5/18/88 Sampled from 55' to 60' Advanced casing to 60' Cleaned casing to 60'	Silty sand with gravel (SM) about 50% brown cmf sand, 30% cmf gravel and 20% silt
60'						
				/ /		

(Test)

Site	Boring No.	Page 6 of ____
Hop Brook Dam CT	FD 88-1 (FD-B)	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RUN / CORE RECVY	BLOWS PER FT.	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
65'	S-13	3"	Rec 20%	1 1 2 1 1 1 1	Sampled from 60' to 65' Advanced casing to 65' Cleaned casing to 65'	Similar Soils (SM)
70'	S-14	3"	0%	WOH 1 1 1 2 1 2 1 1 1	Sampled from 65' to 70' Advanced casing to 70' Cleaned casing to 70' (wood fragments in wash)	
75'	S-15	3"	10%	WOH 1 1 1 1 3	Sampled from 70' to 75' Advanced casing to 75' Cleaned casing to 75'	Wood
	S-16	3"	50%	WOR		

(Test)

Site: Hop Brook Dam CT

Boring No.: FD 88-1 (FD-A)

Page 7 of ____

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RUN / CORE RECVY	BLOWS PER FT.	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
80'		3"	Rec			
				WOR	Sampled from 80' to 85'	Soils similar to sample #13: (coarser sand)
					Advanced casing to 85'	
					Cleaned casing to 85'	
	S-17	3"	20%	WOR / 1		
85'						
				WOR	Sampled from 85 to 90'	Wood
					Advanced casing to 90'	
					Cleaned casing to 90'	
	S-18	3"	30%	/ 1 / 1		
90'						
90.3'					Attempted sampling at 90', bouncing refusal	Grey Gneiss
					Advanced 3 7/8" O.D. roller bit to 90.3	95% Recovery
	R-1	NX	95%		Advanced NX DIAMOND CORE from 90.3' to 95.3	RQD = 62%
						6 pieces, some fragments
						Note - 3 mortar layers of ≈ 1" thickness from 91.9' to 92.7'
95'						

(Test)

Boring No. FD 88-1

Site	Boring No.	Page 8 of
Hop Brook Dam, CT	FD 88-1 (FD-4)	

Depth	Core/Sample No.	Size	Core Recovery	Blows per ft.	Sampling and Coring Operations	Classification of Materials
95.3 – 100.3	R-2	NX	45%		NX-DIAMOND core, from 95.3' to 100.3'	Similar Rock 45% Rec. RQD = 7% Note: wood fragments in lower portions of run
100.3 – 105.3	R-3	NX	49%		NX DIAMOND CORE from 100.3' to 105.3'	Bedrock (weathered) Grey Gneiss with quartz seams 82% Rec. RQD = 17% Note: sample contains highly fractured zones, and weathered zones of clay.
105.3 – 109.5	R-4	NX	100%		NX DIAMOND CORE from 105.3 to 109.5'	Similar Rock, 100% Rec. RQD = 24% Note: - sample contains vertical fractures and weathered zones - gravel fragments were probably introduced from sides of hole above bedrock - part of Run 4 is actual a portion of Run 3 that was not recovered when Run 3 was pulled
109.5					EXPLORATION TERMINATED 5/10/88	

(Test) Boring No. FD 88-1

FIELD LOG OF TEST BORING IN ROCK

SITE Hop Brook Dam, CT ROLE NO. FD 88-1 (FE B) PAGE 9

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR POLL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
5/18/88	90.3	95.3	5'	4.75	95%	Medium	No Return	5' run	30 min	NXM	Run 1
5/18/88	95.3	100.3	5'	2.25	45%	Medium	No Return	5' run	35 min	NXM	Run 2
5/18/88	100.3	105.3	5'	4.1	82%	Medium	No Return	5' run	25 min	NXM	Run 3
5/18/88	105.3	109.5	4.2'	5'	100%	Medium	No Return	4.2' run	25 min	NXM	Run 4

TOTAL BED ROCK DRILLED 19.2 FEET

TOTAL BED ROCK RECOVERED 16.1 FEET

BED ROCK RECOVERY 83.9 PERCENT

DRILLER Mike Hawkin + Paul McMoon

INSPECTOR Greg Hargrave

NED FORM (DEC 63) 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0006

Site Hop Brook Dam CT — Page 1 of ___ Pages

Hole No. FD88-2 (FD-A) Diam. (Casing) NW (3") — Boring Started May 18, 1988

Co-ordinates: N _____ E _____ — Boring Completed May 19, 1988

Drilled by Randy Todd and Robin Price — Report Submitted May 31, 1988

Purpose of Exploration To determine bedrock depth

Elevation Top of Hole 280.5 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 12.5 Feet

Elevation Top of Rock 268 M.S.L.

Elevation Bottom of Hole 249 M.S.L.

Total Rock Drilled 31.5 Feet

Total Depth of Hole 31.5 Feet

Core Recovered 85 %

Core Recovered 24.7 Ft.; NX Diam. 2⅛ In.

Soil Samples — In. Diam. — No.

Soil Samples — In. Diam. — No. — Water Table Depth _____

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	12.5	NW (3" I.D.) spun casing
0	31.5	NX DIAMOND CORE

INDEX

Prepared by Greg Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Limited

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Hop Brook Dam, CT — Page 1 of ___ Pages

Boring No. FD88-2 Desig. FD-A Diam. (Casing) NW (3")

Co-ordinates: N _____ E _____

Elevation Top of Boring 280.5 M.S.L. — Hammer Wt. N/A — Boring Started 5-18-88

Total Overburden Drilled 12.5 Feet — Hammer Drop N/A — Boring Completed 5-19-88

Elevation Top of Rock 268 M.S.L. — Casing Left 0

Total Rock Drilled 29 Feet — Subsurface Water Data _____ Page _____

Elevation Bottom of Boring 249 M.S.L. — Obs. Well _____

Total Depth of Boring 31.5 Feet — Drilled By Todd + Price

Core Recovered 85 % No. Boxes 2 — Mfg. Des. Drill CME 45

Core Recovered 24.7 Ft : NX Diam. 2½ In. — Inspected By: Hargrave

Soil Samples _____ In. Diam. ___ No. — Classification By: Hargrave

Soil Samples _____ In. Diam. ___ No. — Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	BLOWS PER FT. DEPTH RANGE	BLOWS PER FT. CORE REC %	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1.0'	R-1	NX	Rec 100%		NX DIAMOND CORE with water from 0.0' to 1.0'	Boulders
2.5'						
6.5'	R-2	NX	60%		NX DIAMOND CORE with water from 2.5' to 6.5' Void from 4' to 5.5'. Advanced NW casing to 6.5' Clean casing to 6.5' using 2 15/16" O.D. roller bit and water	
	R-3	NX	53%		NX DIAMOND CORE with water from 6.5' to 11.5' void - 10'-11.5' Advanced roller bit to to sound rock at 12.5'	

GENERAL REMARKS:

Site: Hop Brook Dam CT

Boring No.: FD 88-2 (FDA)

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RUN / CORE REC'VY	BLOWS PER FT.	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
12.5'			Rec.		Advanced casing to 12.5' Cleaned casing to 12.5'	
	R-4	NX	76%		NX DIAMOND CORE from 12.5 to 17.5'	Bedrock Grey Gneiss 76% Recovery 56% RQD
17.5'					END OF EXPLORATION 5/18/88 EXPLORATION CONTINUED 5/19/88	
	R-5	NX	100%		NX DIAMOND CORE from 17.5' to 21.5' Note: Run 5 picked up segment of run 4 that was left in hole	Similar Rock 100% Recovery 90% RQD
21.5'						
	R-6	NX	100%		NX DIAMOND CORE from 21.5' to 26.5	Similar Rock 100% Recovery 100% RQD
26.5'						

(Test)

Site	Boring No.	Page 4 of ____
Hop Brook Dam CT	FD 88-2 (ED-N)	

DEPTH	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RUN OR	BLOWS PER FT. CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1" = 2'						
	R-7	NX	96%		NX DIAMOND CORE from 26.5' to 31.5'	Similar Rock 96% Recovery 70% RQD
31.5'					EXPLORATION TERMINATED 5/19/88	

FIELD LOG OF TEST BORING IN ROCK

SITE Hop Brook Dam, CT HOLE NO. FD 88-2 (FD-H) PAGE 5

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
5-18-88	0	1.0	1.0	1.0		Medium	No loss	1' run		NXM	Run 1
5-18-88	2.5	6.5	4.0	2.4	60%	Medium	No loss	4' run	35 min	NXM	Run 2
5-18-88	6.5	11.5	5.0	2.7	53%	Medium	No loss	5' run	26 min	NXM	Run 3
5-18-88	12.5	17.5	5.0	3.8	76%	Medium	No loss	5' run	56 min	NXM	Run 4
5-19-88	17.5	21.5	4.0	5.0	100%	Medium	No loss	4' run	1hr 12min	NXM	Run 5 picked up part of previous run
5-19-88	21.5	26.5	5.0	5'	100%	Medium	No loss	5' run	40 min	NXM	Run 6
5-19-88	26.5	31.5	5.0	4.8	96%	Medium	No loss	5' run	30 min	NXM	Run 7

TOTAL ~~BED~~ ROCK DRILLED 29 FEET

TOTAL ~~BED~~ ROCK RECOVERED 24.7 FEET

BED ROCK RECOVERY 85 PERCENT

DRILLER M. Hawkins + P. McAloon

INSPECTOR Greg Hargrave

NED FORM (DEC 63) 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O.0006

Site Hop Brook Dam, CT — Page 1 of ___ Pages

Hole No. FD88-3 (FD-C) Diam. (Casing) HW (4") — Boring Started May 19, 1988

Co-ordinates: N _____ E _____ — Boring Completed May 20, 1988

Drilled by Mike Hawkins & Paul McAloon — Report Submitted May 31, 1988

Purpose of Exploration To determine the subsurface soil conditions and depth

Elevation Top of Hole 370.5 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 69.3' Feet

Elevation Top of Rock 301.2 M.S.L.

Elevation Bottom of Hole 295.2 M.S.L.

Total Rock Drilled 20.2 Feet

Total Depth of Hole 75.3 Feet

Core Recovered 64 %

Core Recovered 13 Ft.; NX Diam. 2 1/8 In.

Soil Samples 2 3/8 In. Diam. 3 No.

Soil Samples 1 3/8 In. Diam. 6 No. — Water Table Depth _____

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	62'	Split spoon soil sampling @ 5' intervals
41	70.3	3 7/8" rollerbit advanced using "Clear mud"
41	56.2	NX DIAMOND CORE
70.3	75.3	NX DIAMOND CORE

INDEX

Prepared by Greg Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories, Limited

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Har Front [illegible] T Page 1 of ___ Pages

Boring No. FD88-3 Desig. FD-C Diam. (Casing) ___

Co-ordinates: N ___ E ___

Elevation Top of Boring	___ M.S.L.	Hammer Wt.	300/140
Total Overburden Drilled	69.3 Feet	Hammer Drop	18"/30"
Elevation Top of Rock	___ M.S.L.	Casing Left	0
Total Rock Drilled	20.2 Feet	Subsurface Water Data	___ Page ___
Elevation Bottom of Boring	___ M.S.L.	Obs. Well	NA
Total Depth of Boring	75.3 Feet	Drilled By	Mike Hawkins & Scott Fox
Core Recovered	___ % No. Boxes ___	Mfg. Des. Drill	CME 850
Core Recovered	___ Ft : ___ Diam. ___ In.	Inspected By:	G. Hargrave
Soil Samples	2 3/8 In. Diam. 3 No.	Classification By:	G. Hargrave
Soil Samples	1 3/8 In. Diam. 6 No.	Classification By:	___

Boring Started Ma. 19 1988
Boring Completed Ma. 20 1988

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / Rec	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0'–2'	S-1	3"	100%	1 / 1 / 1 / 1	Sampled from 0 to 2' using a 3" O.D. sampling spoon advanced with a 300lbs hammer. Advanced casing to 5'. Cleaned casing to 5' using a 3 7/8" O.D. roller bit and water	Cinders
5'–7'	S-2	3"	100%	1 / 2 / 2 / 1	Sampled from 5' to 7'. Advanced casing to 10'. Cleaned casing to 10'	Silty sand (SM) About 50% medium fine sand, 40% silt and 5% gravel (moist, non-plastic)

GENERAL REMARKS:

Site: Hop Brook Dam CT

Boring No.: FD 88-3 (FD-C)

DEPTH	1":2	CORE/SAMPLE NO.	SIZE	DEPTH RECVY / CORE RECVY	BLOWS PER 6"	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10'		S-3	2"	Rec / 0%	1 1 1 1	Sampled using a 2" spoon advanced with a 300 lbs hammer Note: recovered sample obtained using 3" spoon from 10' to 12'	Similar Soil (SM)
12'							
					---	advanced casing to 15'	
						cleaned casing to 15'	
15'							
		S-4	2"	10%	1 1 1 1	Sampled from 15' to 17' using a 2" spoon and a 300 lbs hammer	Similar Soil (SM)
17'							
						Advanced casing to 20'	
						Cleaned casing to 20'	
20'							
		S-5	3"	0%	6 5 6 6	Sampled from 20' to 22' using a 3" spoon advanced with a 300 lbs hammer	Similar Soil (SM)
22'							
						Advanced casing to 25'	
						Cleaned casing to 25'	
25'							
		S-6	2"	5%	42 15 11 17	Sampled from 25' to 27' using a 2" spoon advanced with a 140 lbs hammer Advanced casing to 30' Cleaned casing to 30'	Poorly graded sand (SP) About 90% course sand; 5% medium-fine gravel; 5% silt (saturated, non-plastic)
27'							

Site	Boring No.	Page 7 of
Hop Brook Dam	FD 88-3 (FD-C)	

DEPTH	1"=2'	CORE/SAMPLE NO.	SIZE	DEPTH RECOV.	BLOWS PER 6" / CORE RECOV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
30' – 32'		S-7	2"	10%	60 18 11 11	Sampled from 30' to 32' -Advanced casing to 35' Cleaned casing to 35'	Similar soil (SP)
35' – 37'		S-8	2"	30%	9 7 6 10	Sampled from 35' to 37' Advanced casing to 40' Cleaned casing to 40' Note: encounter difficult drilling from ≈ 37' to 40'	Poorly graded sand with silt (SP-SM) about 75% brown m f sand, 10% silt and 10% medium-fine gravel
40' – 41'						Advanced 3 7/8" roller bit to 41' using water	Boulders or building stone
41' –		R-1	NX	58%		NX DIAMOND CORE with water 41' to 45.5'	58% Recovery 13% = RQD Mortor seams @ 41.75' and 43.4'

Site: Hop Brook Dam CT | Boring No.: FD 88-3 (FD-C) | Page 5 of ____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RQD / % REC	BLOWS PER FT. CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
45.5'			Rec		Voids - 42 - 42.3', - 42.5' - 42.7', - 42.8' - 43.2'	
49.7'	R-2	NX	69%		NX DIAMOND CORE from 45.5 - 49.7 Voids - 45.8' - 46.0', - 48.3' - 48.4', 49' - 49.3'	Similar Rock 69% = Recovery 8% = RQD Mortar though out run
56.2'	R-3	NX	38%		NX DIAMOND CORE from 49.7' to 56.2' Voids - 50.3' - 50.4', 52.7' - 56.2' Advanced 3 7/8" roller bit from 41.' to 56.2' using "Clear Mud" drilling fluid END OF EXPLORATION 5-19-88	Grey Gneiss 38% Recovery 2% RQD Granular Material
60'					EXPLORATION CONTINUED 5-20-88 Advanced roller bit from 56.2' to 60' using "Clear Mud" drilling fluid	
	S-9	2"	30%	23 22	Sampled from 60' to 62' using a 2" O.D. sampler advanced with a 140 lbs hammer	

(Test)

Boring No. FD 88-3

Site	Boring No.	Page 6 of ____
Hop Brook Dam, CT	FD 88-3 (FD-C)	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RUN / CORE RECVY	BLOWS PER FT. / CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
62'	S-9	2"	Rec 30%	21 28	Advanced roller bit to 70.3' using "clear mud" drilling fluid	Poorly graded sand with gravel (SP) About 60% brown sand with ≈ 35% cm ± gravel and < 5% fines (wet, non-plastic)
						Cobbles + coarse gravel
70.3'						Bedrock
	R-4	NX	100%		NX DIAMOND CORE From 70.3' to 75.3'	Grey gneiss 100% recovery 78% RQD
75.3'					Note: Drillers encountered difficult drilling i.e. hole was starting to collapse, therefore they could only obtain one 5' run of bedrock	
					EXPLORATION TERMINATED 5/20/88	

(Test)

Boring No. FD 88-3

FIELD LOG OF TEST BORING IN ROCK

SITE Hop Brook Dam, CT ROLE NO. FD 88-3 (FD-C) PAGE 7

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
5-19-88	41.0	45.5	4.5	2.6'	58%	Medium	No return	4.5' run	20min.	NXM	Run 1
5-19-88	45.5	49.7	4.2'	2.9'	69%	Medium	No return	4.2' run	25min	NXM	Run 2
5-19-88	49.7	56.2'	6.5	2.5'	38%	Medium.	No return	6.5' run	25min	NXM	Run 3
5-20-88	70.3'	75.3'	5.0	5.0'	100%	Medium	No return	5' run	25 min	NXM	Run 4 (bedrock)

TOTAL ~~BED~~ ROCK DRILLED 20.2 FEET

TOTAL ~~BED~~ ROCK RECOVERED 13 FEET

~~BED~~ ROCK RECOVERY 64 PERCENT

DRILLER M. Hawkins + P. McAloon

INSPECTOR Greg Hargrave

MED FORM DEC 63 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0006

Site Hop Brook Dam CT — Page 1 of ___ Pages

Hole No. FD88-4 (FD-D) Diam. (Casing) HW (4") — Boring Started May 23, 1988

Co-ordinates: N _____ E _____ — Boring Completed May 24, 1988

Drilled by Todd Burnham + Scott Fox — Report Submitted May 31, 1988

Purpose of Exploration To determine subsurface soil conditions and depth

Elevation Top of Hole 363.7 M.S.L. — Casing Left in Place 0 Feet

Total Overburden Drilled 32.7 Feet

Elevation Top of Rock 331.0 M.S.L.

Elevation Bottom of Hole 320.2 M.S.L.

Total Rock ~~Drilled~~ cored 10 Feet

Total Depth of Hole 43.5 Feet

Core Recovered 93 %

Core Recovered 9.3 Ft.; NX Diam. 2½ In.

Soil Samples 1 3/8 In. Diam. 10 No.

Soil Samples _____ In. Diam. _____ No. — Water Table Depth _____

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0	28	HW (4") spun casing
28	33.5	3 7/8" roller bit with "clear Mud"
33.5	43.5	NX rock core
0	30	split spoon soil sampling on 5' intervals

INDEX

Prepared by Greg Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories, Ltd

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
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NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Hop Brook Dam CT Page 1 of ___ Pages

Boring No. FD88-4 Desig. FD-D Diam. (Casing) HW (4")

Co-ordinates: N _____ E _____

Elevation Top of Boring 363.7 M.S.L. Hammer Wt. 140 lbs Boring Started 5-23-88

Total Overburden Drilled 32.7 Feet Hammer Drop 30" Boring Completed 5-24-88

Elevation Top of Rock (Core) 331.0 M.S.L. Casing Left 0

Total Rock Drilled 10 Feet Subsurface Water Data _____ Page _____

Elevation Bottom of Boring 320.2 M.S.L. Obs. Well _____

Total Depth of Boring 43.5 Feet Drilled By T. Burnham + Staff Fcr

Core Recovered 93 % No. Boxes 1 Mfg. Des. Drill CME 850

Core Recovered 9.3 Ft : NX Diam. 2 1/8 In. Inspected By: Greg Hargrave

Soil Samples 1 3/8 In. Diam. 10 No. Classification By: G. Hargrave

Soil Samples _____ In. Diam. ___ No. Classification By: _____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH X RANGE	BLOWS PER FT. CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0.0	S-1A	2"	Rec	6	Sampled from 0.0' to 2.0' using a 2" O.D. sampler advanced with a 140 lbs hammer	Silty sand (SM) About 60% grey cmf sand, about 35% silt and ≈ 5% fine gravel (moist, non-plastic)
	S-1B		40%	5 7 7		
2.0'					Spun HW (4") casing to 3' using water as a drilling fluid	Silty sand (SM) About 50% brown cmf sand, about 45% silt and ≈ 5% mf gravel (moist, non-plastic)
3.0'						
	S-2	2"	15%	10 3 3 3	Cleaned casing using a 3 7/8" roller bit to 3.0' Sampled from 3.0' to 5.0'	Similar Soil (wet) (SM)
5.0'					Advanced casing to 8'. cleaned casing to 8'	
8.0'						
	S-3	2"	30%	13 8 6 8	Sampled from 8.0' to 10.0'. Advanced casing to 13' cleaned casing to 13'	Similar Soil (SM)
10.0						

GENERAL REMARKS:

Site	Boring No.	Page 3 of ____
Hop Brook Dam, CT	FD88-4 (FD-D)	

DEPTH	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE RECOVERY	BLOWS PER FT. CORE	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
13.0'			Rec	---		
15.0'	S-4	2"	40%	8 6 8 10	Sampled from 13' to 15' Advanced casing to 18' Cleaned casing to 18'	Similar soil. (SM)
18.0'						
20.0'	S-5	2"	40%	8 8 27 30	Sampled from 18.0' to 20.0' Advanced casing to 23' Cleaned casing to 23'	Silty gravel with sand (GM) About 50% brown cmf gravel, 25% cmf sand and 25% silt (saturated, non-plastic)
23.0'						Poorly graded sand (SP); about 95% brown mf sand and < 5% silt (wet, non plastic)
25.0'	S-6a S-6b S-6c	2"		17 38 72 47	Sampled from 23' to 25' Advanced casing to 28' Cleaned casing to 28'	Poorly graded gravel with sand (GP) about 60% brown cmf gravel, 40% cmf sand and < 5% silt (wet, nonplastic)
						Silty gravel with sand (GM) about 40% grey mf gravel, 40% cmf sand, and 20% silt (wet, non-plastic)

Site: Hop Brook Dam, CT

Boring No.: FD 88-4 (FD-D)

Page 4 of ____

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RUN	BLOWS PER 6" CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
28'			Rec		END OF EXPLORATION 5/23/88	
30'	S-7	2"	-	100/3"	EXPLORATION CONTINUED 5/24/88. Sampled from 28' to 28.3. Advanced roller bit with "Clear Mud" drilling fluid to 33.5'	Silty gravel with sand (GM) Around 60% mf gravel 25% cm-f sand and 15% silt. (saturated, non-plastic)
33.5'						Bedrock
38.5'	R-1	NX	57"		NX DIAMOND CORE with water from 33.5' to 38.5'	Grey micaceous gneiss The entire run is weathered 96% Rec. 26% RQD
43.5'	R2	NX	60"		NX DIAMOND CORE with water from 38.5' to 43.5' EXPLORATION TERMINATED 5/24/88	Similar Rock Top 2' of run is weathered 90% Rec 34% RQD

(Test)

Boring No. FD 88-4

FIELD LOG OF TEST BORING IN ROCK

SITE Hop Brook Dam, CT ROLE NO. FD 88-4 (FD-D) PAGE 5 of

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
5-24-88	33.5	38.5	5'	4.8'	96%	Medium	NO LOSS NOTED	5' run	27 min	NXM	Run 1
5-24-88	38.5	43.5	5'	4.5'	90%	Medium	NO LOSS NOTED	5' run	35 min	NXM	Run 2

TOTAL BED ROCK DRILLED 10 FEET

TOTAL BED-ROCK RECOVERED 9.3 FEET

BED ROCK RECOVERY 93 PERCENT

DRILLER Todd Burnham, Scott Fox

INSPECTOR Greg Hargrave

NED FORM DEC 63 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

SECTION 9

OTHER RECORDS TAKEN

a. Survey Notes

①	HORZ ∠	STADIA DIST	VERT ∠	Rod READ	
B-B	257°08'40"	.97	89°45'40"	5.00	
B-D	75°39'40"	1.19	93°25'00"	5.00	
TP@B-C	HI=5.17				
BS-4+40					
B-C	260°55'40"	5.20	91°14'	5.00	
B-A	271°37'40"	108°47'20"	3.32	5.00	
TP@4+40	HI=5.26				
BS 3+57.8